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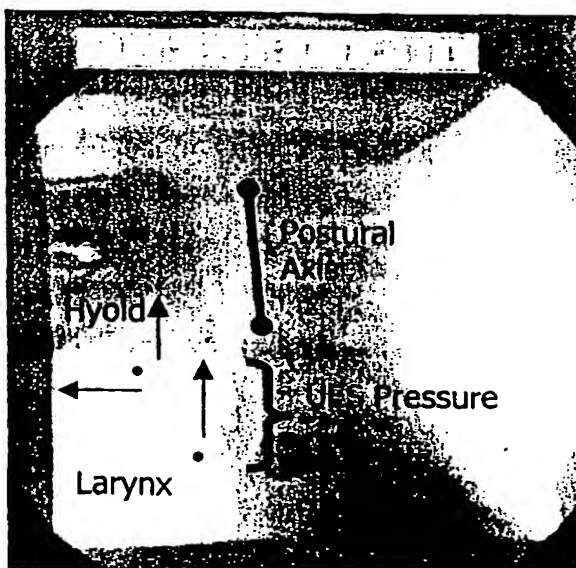
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(54) Title: METHODS AND DEVICES FOR INTRAMUSCULAR STIMULATION OF UPPER AIRWAY AND SWALLOWING MUSCLE GROUPS



(57) Abstract: Devices and methods were discovered that successfully provided patient autonomous control of both hyolaryngeal elevation, anterior hyoid motion and opening of the upper esophageal sphincter for swallowing by intramuscular stimulation of two muscles. The technology allows patient self stimulation of swallowing and can return oral feeding to dysphagia patients. Indwelling electrode stimulation of only two muscles generated as much as 80 % of normal synergistic movement leading to swallowing. The devices and methods also are useful for control of other upper respiratory muscle groups involved in speech and voice. Calibration techniques may be used in combination for greater freedom in setting and using electrodes over extended implantation time periods. These methods and devices can control complex movements of body solids such as bone and cartilage and tissues by electro stimulation of a minimum set of muscles simultaneously.

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A. CLASSIFICATION OF SUBJECT MATTER

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US CL : 607/42

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 607/1-156

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|------------|--|-----------------------|
| Y | US 2002/0049479 A1 (PITTS) 25 April 2002 (25.04.2002), see entire document. | 21,22,23 |
| Y | US 6,198,970 B1 (FREED et al) 06 March 2001 (06.03.2001), see entire document. | 28-32 |
| Y | US 2002/0133194 A1 (LEELAMANIT et al) 19 September 2002 (19.09.2002), see entire document. | 28-35 |

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☐ See patent family annex.

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